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COMPARISON DOCUMENT

WHITE RIVER SHALE PROJECT

DETAILED DEVELOPMENT PLAN

and

1973 PROGRAMMATIC EIS

OIL SHALE OFFICE
CENT[illegible]

U. S. DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY
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INTRODUCTION

In light of CEQ Regulations 40 CFR 1502.9(C) and Departmental Manual 516 DM3.2A, 4.5A, and 4.5C, the following analysis of major oil shale development issues, as presented in the 1973 Final Environmental Statement for the Prototype Oil Shale Leasing Program and in the August 1981 Tracts U-a and U-b Detailed Development Plan, was made to determine if:

a) Any significant environmental impacts that were not identified and described in the Final Environmental Statement can be expected to result from implementation of the plan, and

b) The degree of impacts to be expected from implementation of the plan would be consistent with the degree of impacts that the Final Environmental Statement predicted might result from oil shale development on Tracts U-a and U-b.

The development method to be used on Tracts U-a and U-b is room-and-pillar mining with surface processing. Three types of surface retorts, Union B, Superior, and TOSCO II will be used.

The expected impacts presented in the EIS have been compared with the expected impacts presented in the DDP. The analysis of these impacts by subject area follows.

LAND IMPACTS

EIS

The EIS sets out total land disturbance as follows (Vol. 3, p. IV-26):

Requirements	Years			
	5	10	20	30
Underground:				
Surface disposal:				
Cumulative land disturbed	350	700	1,450	2,210
Canyon	A	A	A	A
Underground disposal (60%):				
Cumulative land disturbed	350	600	800	1,090
Canyon	A	A	A	A

This amount of land disturbance is based on a production rate of 50,000 BPD of shale oil.

DDP

The DDP gives total land disturbance planned as follows (Vol. 2, p. 4-81):

Approximate Disturbed Areas
(Acres)

Type of Disturbance		Disturbed Areas				Treatment of Disturbed Areas(a)	
		Phase I	Phase II	Phase III	Total	Paved and Built-Over (Including Dam Pools)	Revegetated During Operation
Access Roads(b)		44	—	—	44	20	22
Utility Corridors(c)		11	31	—	42	—	42
Construction Camps		85	35	46	166	—	166
Fines Stockpile (Phase I)		36	—	—	36	—	36
Processed Shale Landfill and Conveyance(d)		162	501	1,770	2,433	—	2,433
Phase I Dam(d,e)	Dam(f)	3	—	—	3	—	3
	Pool(f)	19	—	—	19	19	—
Southam Canyon Retention Dam(e)	Dam(f)	—	6	—	6	—	6
	Pool(f)	—	35	—	35	35	—
Process Site							
Tank farm and dikes		8	14	24	46	11	35
Wastewater holding basin	Dam(f)	3	—	—	3	—	3
	Pool(f)	17	—	—	17	17	—
Freshwater reservoir(e)	Dam(f)	—	3	—	3	—	—
	Pool(f)	—	14	—	14	14	—
Process pad, roads, buildings, sulfur product storage, etc.		70	80	89	239	75	12
Mining adits and shafts, stockpiles, service building, explosives storage, etc.		12	6	4	22	17	5
Mine Vent Shafts and Excavation Landfill		—	3	1	3	—	3
Total		470	728	1,933	3,131	208	2,766

(a) Figures in these columns do not equal "Total Disturbed Area" because some slopes may not be revegetated owing to fire hazards. Also, some areas revegetated during Phase I will be filled over during construction of Phases II and III.
(b) Areas for access roads include allowances for an electric utility line.
(c) Phase I 6-inch freshwater pipeline includes an allowance for an electric utility line.
(d) Phase I catchment is filled over during Phase II.
(e) Pool areas for all impoundments except freshwater reservoir are maximum design areas.
(f) Dam areas indicated are the areas left exposed when maximum design pool is impounded.

Comparison

The 1973 EIS evaluated total land needs for a period of 30 years' operation at a rate of 50,000 barrels a day. At that rate, it would take 40 years to exhaust available tract reserves. Extending the table on page IV-26 of Volume 3 to 40 years gives a land need of about 3,000 acres which is very close to

the 3131 acres specified in the DDP. Both EIS and DDP point out that only a fraction of the acreage would be disturbed at any given time because of contemporaneous reclamation.

Based on the above, land needs are consistent with the amounts specified in the EIS.

CORRIDORS

1973 EIS

The EIS (Vol. 3, p. IV-4) sets out the following utility corridors needed:

Power - Generated on-site or obtained from Jensen, 35 miles to the north.

Water - Water will be obtained through construction of a 10 mile 16" pipeline to the White River.

Natural Gas - Construction of a 15 mile 12" diameter pipeline to Bonanza, Utah.

Product Pipeline - Construction of six miles of a 12" diameter pipeline north of the tract.

Roads - Construction of eight miles of paved highway from the end of the state highway at Bonanza. A bridge across the White River will also be needed.

A total of 200-600 acres of land would be needed for these utility corridors.

DDP

The lessee in their DDP set out the following requirements:

Power - The existing 69 KV line from Vernal to Bonanza will be upgraded to 138 KV. From Bonanza to tract a new nine mile open wire line will share the same corridor as the access road (DDP Vol. 1, p. 3-130).

Water - Water will be pumped from the proposed White River Dam to the plant site via a 1.7 mile 24" pipeline during full commercial production of 113,950 BPD. All of the pipeline and pumping station would be on tract (DDP Vol. 1, p. 3-146; Vol. 2, p. 7-74).

Natural Gas - No natural gas will be imported. High BTU gas processing facilities on tract will produce all necessary fuel gas needed on tract.

Product Pipeline - Construction of a pipeline north from the tract to tie in with existing pipelines will be built. It is uncertain whether the terminus of this pipeline will be in Bonanza, Utah, or Rangely, Colorado.

Roads - The county is planning to upgrade and realign County Road 45 from Bonanza to a point 0.8 miles south of the river. The access road will go from the former point to the plant site. Some upgrading of the state highway from Bonanza to Vernal will be needed. A new bridge over the White River will be built (DDP Vol. 1, p. 3-163).

Approximately 275 acres will be disturbed in the development of utility corridors. Approximately 230 acres of this amount will be revegetated during operations (DDP Vol. 2, p. 4-81).

Comparison

Land needed for corridors is consistent with that given in the EIS. Needed service corridor general routes are also consistent with those given in the EIS. Exact routing has been designed to utilize existing facilities and rights-of-way to minimize impact.

RESOURCE RECOVERY

1973 EIS

At the time the EIS was written, no core drilling had been done on Tract U-a. The oil shale zone which would average 30 gallons per ton (GPT) was estimated to be 45' thick. The shale oil recoverable by underground mining methods was estimated at 244.4 million barrels. The overburden depth ranges from 550-1225' with an average of 850' (Vol. 3, p. II-89).

The oil shale zone on Tract U-b which averages 30 GPT is approximately 50' thick. The shale oil recoverable with underground mining methods is estimated at 265.8 million barrels. The overburden ranges from 300-1250' with an average depth of 700' (Vol. 3, p. II-91).

Nahcolite occurs as very thin lenses or beds and small pods in the upper part of the Green River Formation on both tracts (Vol. 3, p. II-91). One narrow gilsonite vein less than 2" wide outcrops on tract (Vol. 3, p. II-91).

DDP

Core samples on Tract U-a have an average thickness of approximately 55' with an average Fischer Assay yield of 28 GPT. Overburden over the Mahogany Zone ranges from 550 to 1225' with an average depth of 850'. The shale oil

resource in the mining zone is estimated at 540 million barrels of which 63% (340.2 million barrels) is recoverable with underground room-and-pillar mining (DDP Vol. I, p. 1-13).

Four gas wells were drilled here prior to 1974. Three wells were dusters and one flowed at 11,000 cf/d. This well is currently shut in.

The oil shale zone on Tract U-b is the same as on Tract U-a. The overburden thickness ranges from 300-1250' with an average of 700'. The shale oil resource in the mining zone is estimated at 510 million barrels of which 63% (321.3 million barrels) is recoverable with underground mining (DDP, Vol. 1, pp. 1-13 and 3-58).

Several veins of gilsonite have been located on tract but none are of commercial size at this time.

Comparison

The DDP estimates approximately 150 million more barrels of shale oil are recoverable than estimated in the EIS. Thus the estimated recovery of shale oil on Tracts U-a and U-b at this time is better than that estimated by the EIS for underground mining and surface retorting.

FLORA/GRAZING

EIS

The EIS (Vol. 3, p. IV-43) projected the acres of each vegetation type likely to be lost with an underground mine and surface retorting facilities.

TABLE IV-11.-Vegetation Impact Areas, Tracts U-a and U-b, Underground Mine

	Vegetation Disturbed, Acres						
			Process Shale			Totals	
Plant Communities	Facilities	Mine and Overburden	Surface1/	Backfill2/	Utility Corridors	Surface1/	Backfill2/
Pinyon-juniper Juniper, serviceberry, Indian ricegrass, stipas	90	5	1,120	440	110	1,325	645
Salt desert breaks Four-wing saltbush, greasewood, Indian ricegrass	50	5	560	230	50	665	335
Loamy salt desert Shadscale, winterfat, wildrye, stipas	0	0	180	70	10	190	80
Rough broken land Big sage, black sage, bluegrasses	0	0	0	0	30	30	0
Totals	140	10	1,860	740	200	2,210	1,090

1/ Disposal totally on surface.

2/ Maximum backfilling of spent oil shale into mine workings.

The acres of each vegetation type lost with in situ extraction are as follows:

TABLE IV-12 Vegetation Impact Areas, Tracts U-a and U-b, In Situ Extraction

Plant Communities	Vegetation Disturbed, Acres					
	Facilities	Drilling	Overburden	Processed shale	Utility Corridors	Total
Pinyon-juniper juniper, serviceberry, Indian ricegrass stipas	30	5,230	0	0	330	5,590
Salt desert breaks Four-wing saltbush, greasewood, Indian ricegrass	20	2,020	0	0	150	2,190
Loamy salt breaks Shadscale, winterfat, wildrye, stipas	0	400	0	0	30	430
Rough broken land Big sage, black sage, bluegrasses	0	400	0	0	90	490
Totals	50	8,050	0	0	600	8,700

The tracts are characterized by desert shrub and pinyon-juniper types. Pinyon-juniper was estimated to cover 55% of the tracts with desert shrub occupying an additional 40% of the tracts (Vol. 3, p. II-95).

The soils on upland sites are very shallow and poorly developed due to the dry desert climate. No rare or endangered plants were found on the tracts.

The estimated average carrying capacity is estimated at 7 A/AUM (Vol. 3, p. IV-110). Based on a 50,000 BPD, 30-year operation involving both tracts, the following reduction in grazing carrying capacity should occur:

Operation	Total Acres Affected	Average Area Lost to Grazing Acres/Year	Average Grazing Loss AUM's/Year	30-Year Accumulative Total AUM Loss
Underground	2,210	1,100	157	4,710
In Situ	8,700	1,550	221	6,640

DDP

The DDP does not break down the acres of disturbance by vegetation type; however, looking at the Figure on p. 5-51 of the DDP, most of the disturbed areas are shown as pinyon, juniper, or sagebrush-greasewood types. The DDP states the pinyon-juniper type covers 35-40% of the tracts (Vol. 1, p. 2-139). The shadscale and sagebrush greasewood are the next most abundant at 25-30% each (Vol. 1, p. 2-140).

Approximately 3,000 acres (p. 5-61) of grazing land will be removed from grazing during the life of the development. This removal will not all occur at once. This is simply the maximum acreage that will be affected. It does not reflect land reclaimed for grazing use during the life of the project. The DDP (p. 5-60) estimates there will be approximatly a 17% reduction or 680 A.U.M. in the current level of grazing. Again this assumes the maximum loss with no reclamation.

Vegetative productivity varies widely from year to year depending on temperature and precipitation. Vegetative productivity occurs in two phases, both tied to the weather: early spring production by annuals and spring/summer production by perennial vegetation.

Annual productivity varies by wide extremes. Average annual biomass production in the riparian type was 4760 lb/Ac during 1975. This figure dropped to 180 lb/Ac in 1977. Conversely the juniper type produces very little annual biomass. The corresponding production figures for 1975 and 1977 were 35 lb/Ac and 0 lb/Ac (p. 2-147).

Productivity of perennial species is much more stable between years. The only vegetation type showing much variation between years is the riparian type. Vegetation here is much more water-loving and therefore more responsive to any shortage. Perennial shrubs, trees, and forbs produced an average of 5250 lb/Ac in the riparian type during 1974. This declined to 2700 lb/Ac in 1975. The juniper type varied from 2250 lb/Ac to 1190 lb/Ac while the shadscale type produced 1150 lb/Ac both years (p. 2-147).

The acreage of new land lost to production each year will average 115-125 acres. Using the BLM estimate of 7 acres needed per A.U.M., approximately 17 AUMs per year will be lost. Assuming no revegetated land was returned to grazing use for 25 years, the total cumulative loss would be 425 AUM's.

The DDP states that plant communities within 20 kilometers of the plant may be affected by SO_2 emissions (p. 5-58). This effect will cause some change in plant composition and productivity. The amount of the change is impossible to predict.

No threatened or endangered plant species have been found on the tracts. A small population of a new species, *Pensteman alba-fluvis* was discovered north of the White River. No plants listed for review as threatened or endangered have been located on the tracts.

Comparison

The estimated cumulative loss in carrying capacity is 425 AUM vs. 4710 AUMs projected in the EIS. This is an order of magnitude less than the EIS projected.

No threatened or endangered plant species have been located on the tracts.

While the total land area disturbed is slightly more than that given in the EIS, the actual impacts to wildlife and domestic livestock grazing are less than those projected in the EIS.

FAUNA

EIS

The EIS (Vol. I, Ch. 3) discusses regional impacts on fauna. Specifically considered were impacts from access roads, including road kills, induced stress, loss of habitat, water quality changes, oil spills, herbicides and pesticides, air quality changes, urbanization, and hunting and fishing pressures. Cumulative impacts on threatened species, big game, raptors, other small animals, fish, and agriculture were considered.

Specific faunal impacts are discussed in Vol. 3, Ch. IV, beginning on page IV-112. The indirect effects related to increased numbers of people and improved access will have the greatest impact (p. IV-113). The EIS projected 1300 acres of preferred deer browse species (bitterbrush, mountain mahogany, and serviceberry) would be lost. An additional 30 acres of sage grouse habitat and 670 acres of chukar habitat would be lost. All of the habitat lost would be suitable for cottontails, jackrabbits and other small mammals (p. IV-114).

Development of Tracts U-a and U-b would eliminate habitat essential to wintering bald and golden eagles as well as other raptors (p. IV-114).

The aquatic habitat of the White River could be severely impacted by the introduction of salts, toxic substances and silt (p. IV-113). The Colorado River squawfish, humpback sucker, and bonytail chub could be eliminated from the White River below Evacuation Creek due to accidental releases of toxic materials (p. IV-114).

DDP

The DDP agrees with the EIS in that indirect impacts resulting from increased numbers of people using the area will be the major impact (p. 5-60).

There is no mountain browse type on the tracts (Fig. 5.4-1, p. 5-51). Thus, the loss of 1300 acres of preferred deer mountain browse habitat will not occur. A small number of deer which use the area of the processing facilities year around will be displaced. Deer use of Southam Canyon is very light due

to lack of available water. The total deer population within the study area is estimated at 150-250 during the summer and 50-100 during the winter (1979 Progress Report, p. 4.3-71).

Sage grouse have not been discovered within the Tracts U-a and U-b study area (Table 4.3-17). The absence of brood habitat and permanent water on the tracts eliminates the possibility of sage grouse occurring there.

In 1979, chukars were observed on the tracts (Table 4.3-17); however, they were not seen in 1980. Chukars have been planted near the tracts for years but they do not seem to be able to expand their numbers. The absence of dependable water is probably one factor. The large amount of shadscale vegetation and cheatgrass present should provide excellent habitat.

Twenty species of raptors are known to use the tract area winter or summer. One golden eagle nest located along the west end of the disposal pile will be impacted. This nest is presently used every 2-3 years (p. 5-62). It will be near the end of commercial production before the shale pile reaches the nest site located high up in a rock wall. The short time period that shale will be disposed of near it reduces the impact. The nest itself will not be affected.

The shadscale vegetation type produces the greatest rodent densities. This vegetation type will be largely unaffected by development which will reduce any impact on raptors.

Prairie falcons nested within one kilometer of the process area in 1975. This site was not reused but another pair nested in Evacuation Creek in 1977 (p. 5-63). No other nests have been found. Peregrine falcons have been observed on tract but no nests were found. No species of threatened or endangered fauna except bald eagles and the peregrine falcons have been found within the study area.

No specific impacts on the aquatic habitat are expected from discharges. Although no discharges are planned, accidental spills could affect the White River; however, there is no way to quantify this in advance.

Pumping of water from the White River could impact the threatened and endangered fish species present. Again, it is not possible to quantify possible impacts because habitat requirements for the three species of fish, Colorado squawfish, humpback chub, and bonytail chub are not known.

Comparison

Impacts on deer are much less than projected in the EIS because the deer population is small and severely restricted by a lack of dependable water.

Impacts on game birds and raptors will be less than projected in the EIS due to a lack of desirable habitat within the develoment area.

Impacts on fish in the White River will depend primarily on the amount of water pumped. An agreement signed by the USF&WS allows pumping only for the construction phase. Prior to operations under Phase I and the commencement of Phase II, a review of water needs will be made based on the latest engineering design. The source of water needed will be decided at that time from the stated alternatives.

RECLAMATION

EIS

The EIS discusses reclamation, revegetation, and techniques for reclamation beginning in Vol. I, p. I-52; both disturbed areas and waste disposal sites are covered. The two basic methods of revegetating processed shale are discussed. These are revegetating processed shale directly and covering processed shale with topsoil-like material prior to revegetation.

DDP

The DDP presents a method of revegetating processed shale consistent with the characteristics of cold desert climate. The lessees propose to install a system of contour terracing on the slopes of the processed shale. On each terrace a shallow trench will be dug and filled with topsoil-like material. The trench will then be seeded with various species of shrubs and grasses which will be tolerant of highly alkaline conditions. The bare slopes of processed shale are stabilized and sealed with soil sealants to increase the amount of runoff from the slopes onto the terraces. The concentration of water will possibly do two things: 1) improve growing conditions and 2) leach salts down in the processed shale of the terraces. This may allow the new vegetation to move out from the soil trenches into the processed shale.

This reclamation proposal has several good points:

1) Concentrating the rainfall increases the chance of plant establishment from very low to very good. Normally, duration and distribution of the annual rainfall dictates whether seedlings can become established.

2) A very thin natural mantle of topsoil-like material is insufficient to cover a processed shale pile and provide an adequate growing medium. By concentrating soil in trenches, it will provide an adequate medium.

3) The species of shrubs well adapted to the area are capable of withstanding alkaline conditions considerably worse than fresh processed shale. Thus, they should move out and colonize the processed shale.

4) Two test sites, Paraho, Colorado, and Bonanza, Utah, are presently being used to demonstrate this concept on Paraho processed shale.

Comparison

The reclamation goals are consistent with those discussed in the EIS. Namely, produce a productive self-perpetuating vegetative cover on the processed shale. The specific technique is a combination of the basic methods discussed in the EIS.

SOCIOECONOMICS

1973 EIS

Socioeconomic, regional baseline, and regional impact considerations are discussed in the EIS in Volume I, Chapter II-A-11, II-B-11, II-C-10 and III-H. Volume III, Chapter II-B-3-k and IV-G-2 discussed site specific impacts. In addition, other volumes and chapters also discuss socioeconomic considerations in response to comments and EIS requirements. The regional three state analysis is based on a production level of 400,000 barrels per day by 1982 resulting in an employment level of 17,800 and population increase of 48,200. If production were to reach 1 million barrels per day, employment would reach 42,400 and population 114,800. Population overall was expected to increase 40-50 percent on the basis of a 400,000 barrel per day industry.

The site specific analysis for Tracts U-a and U-b was based on a production level of 50,000 barrels per day resulting in total construction employment including urban construction of 3,531 in 1979 and total permanent employment including support of 2,289 in 1980. Population would increase by 8,615 during construction and 6,183 during operations.

Two-thirds of the population was estimated to reside in the Vernal area increasing the population from 4,000 to 9,000 with the rest residing in the Rangely area increasing population from 1,500 to 10,500 including increase from development of Tract C-a.

1981 DDP

Employment projections for the project are stated in the DDP. Socioeconomic impacts associated with the proposed development of Tracts U-a and U-b are addressed primarily in a supplemental report to the DDP entitled "Community and Infrastructure Support Study." The project is based on the phased operations schedule described in the DDP resulting in a commercial production rate of 106,230 barrels per stream day (bpsd) in 1994 (DDP, Vol I, p. 3-6). Maximum employment requirements and resulting population are projected to be in the year 1991 which is when construction workforce for the entire project reaches its peak.

In order to mitigate initial impacts, WRSP plans to operate and maintain a construction camp on-tract during the construction phase of the project

consisting of a recreational vehicle park and bachelor facilities. The entire single status construction workforce as well as some married couples are projected to reside in this camp (Supplement, p.xv). It is estimated that 76 percent of the WRSP-induced population not assigned to the campsite will reside in the Ashley Valley with the remaining 24 percent residing in Rangely, Colorado (Supplemental, p. 1-2). Direct employment and population estimates are as follows (Supplemental, p. 1-5):

	1989	1994
Direct Population		
Construction-related	8,543	0
Operations-related	3,446	8,978
Total	11,989	8,978

A peak workforce of 5,094 will be required in 1991 with a commercial full-scale workforce of 3,353 required from 1994 through the life of the project (DDP Vol. I, pp. 3-183).

Total population influx associated with direct and all secondary employment is estimated to be a maximum of 18,132 in 1989 decreasing to 15,935 in 1994 (Supplemental, p. 1-6). Of the 18,132, 1899 will reside in the construction camp, 3896 will reside in Rangely, and 12,337 will reside in the Ashley Valley. The long-term population increase of 15,935 will result in 3824 residing in Rangely and 12,110 residing in the Ashley Valley (Supplemental, p. 7-32).

Comparison

Employment and population projects were presented in the EIS and DDP. The socioeconomic supplement which analyzes socioeconomic impacts in detail was submitted and distributed with the DDP for informational purposes but it is not an approvable document under terms of the lease and applicable regulations.

The type of socioeconomic impacts expected from the project are consistent with those set out in the EIS. The degree of impacts regionally from the current industry and the proposed Utah action are within the range set out for a 400,000 BPD industry. The site specific employment estimates are larger than set out in the EIS, mainly due to increased production.

To the extent that the employment and population influx has been delayed from the dates set out in the EIS, additional time for planning to mitigate impacts has been available and has been accomplished. Planning since the original socioeconomic study for the project was released to the public in 1975 has been done on the higher production, employment and population estimates.

SUBSIDENCE

EIS

The EIS (Vol. III, P. IV-19, 25, 49) discusses subsidence for in situ and underground mining on Tract C-b. Although an absolute prediction was not possible, it states that while significant displacement is not expected, surface displacement might possibly be in the order of tens of feet. The EIS (Vol. III, p. IV-30) further states subsidence might occur with underground mining on Tracts U-a and U-b. However, if processed shale is returned to the mine as backfill, it would be expected to eliminate the effect of subsidence.

DDP

The DDP recognizes subsidence is possible from underground mining (Vol. II, p. 4-93). However the room-and-pillar mining is designed to provide sufficient overburden support with a substantial margin of safety (Vol. II, p. 6-99).

The lessees plan to implement a monitoring program which will determine if any subsidence does occur and provide mitigating actions.

Comparison

The EIS and DDP both recognize that subsidence is possible from underground mining. In any event, the subsidence should be slight and uniform over the tracts.

WATER MANAGEMENT

1973 EIS

The EIS (Vol. 3, p. IV-77) estimates consumptive water demand using a 50,000 BPD example underground mine with surface retorting at 6,060-9,600 AF/Y. Associated urban development would use 740-1,000 AF/Y.

The oil shale zone on the tracts contains very limited amounts of water. The mine will be essentially dry (Vol. 3, p. IV-88).

The Utah Division of Water Resources presently holds a pending application for 250,000 AF/Y from the White River (Vol. 3, p. IV-86).

Development water is expected to come from the White River or from the Green River.

DDP

The DDP (Vol. 2, p. 5-45) estimates a peak water demand of 14,012 gpm or 31 cfs for a commercial production of 106,000 BPD of shale oil. All of this water is expected to come from the White River Dam. Should the White River Dam not be built then water would have to be purchased from Flaming Gorge

Reservoir and diverted overland via a pipeline approximately 30 miles to the tracts.

Water needed for initial construction will be drawn from the White River from a well field. This use amounts to a maximum of 146 gpm (0.32 cfs) for construction through 1985 (8/10/81 WRSP memo).

The ultimate source of operational water will depend whether or not the White River Dam is built. If not, alternate sources specified in the DDP will be used.

Comparison

The DDP projects a water use of 22,630 AF/Y at a production rate of 106,000 BPD. Converting the 50,000 BPD rate in the EIS to 100,000 BPD gives a water use of 19,200 AF. This compares well with the DDP projection which is the maximum rate during the driest part of the year. The normal use would be less. Thus, the impacts compare well with those given in the EIS.

HYDROLOGIC IMPACTS

1973 EIS

The EIS in Vol. I, p. I-22-26, discusses leaching of processed shale placed on the surface. The variation due to type of retorting used is recognized. Surface impoundment of the leachate is the recommended method of control. Vol. I., p. I-44, recognizes a potential for high concentrations of Na^+, CA^{++}, Mg^{++}, and $SO_4^=$ in surface runoff. "However, with proper compaction, the piles became essentially impermeable to rainfall." The EIS (Vol. I., p. III-71-94) discusses in detail processed shale placement and hydrologic effects, including sediment and leaching. Table III-9 gives estimates of quantities of leachable material.

Vol. I, P. III-77-109, discusses potential impacts on surface water quality from runoff of the processed shale pile. An example using a storm intensity of .3 in/hr and .5 in/hr lasting for six hours was used. On p. III-89, it was concluded, "...the water quality of Piceance Creek would not be greatly affected from a storm of these intensities by leaching the minerals contained in the spent shale area. However, for this example, the total salt load would be increased by 2400 to 5500 tons." Also on p. III-89 it projected, "Over the relatively short term (decades), the spent shale piles, if maintained in a mechanically stable condition, may contribute somewhat lower salt/sediment loads than are now contributed to the region's river system by the unconsolidated materials typically found on canyon floors.

Significant quantities of ground water are not expected to occur on the Utah tracts. The mine there is expected to be essentially dry, thus eliminating the need for extensive dewatering (Vol. 3, p. IV-86).

DDP

The Lessee does not expect to have any noticeable affect on the small quantities of ground water present on the tracts. Their water management plan is geared to handling water produced on the surface primarily from retorting and processing facilities. The total volume of water expected is 2925 GPM, (Vol. II, p. 4-74). All of this water will be treated and used as makeup water for the scrubbers and in moisturization of the processed shale (Vol. II, p. 4-75).

No discharge of water is planned nor is any reinjection of excess water planned. Since no discharge is planned, all impoundments will be constructed to be impervious to infiltration (Vol. II, p. 4-83, 4-87).

The Birds Nest Aquifer is confined and under artesian pressure within Tract U-a. The overlying formations have very low permeability. Thus it is unlikely that the Birds Nest Aquifer could be detrimentally affected by leachate from the processed shale, seepage from on-tract impoundments, or mining operations (Vol. II, p. 4-92).

Comparison

The above discussion indicates the EIS anticipated impacts primarily from mining and processing. The EIS recognized the impacts were to a large extent dependent on the site and technology used. Using worst case situations, it concluded these impacts were manageable and reasonable. The DDP recognizes that surface disposal of processed shale could have the greatest hydrologic impact. All impoundments are designed to be impervious to prevent the escape of leachates from processed shale to surface and subsurface water.

Potential impacts from development of Tracts U-a and U-b are of the same type and magnitude as contained in the EIS. Mitigation measures contained in the DDP are designed to reduce these impacts below the ranges given in the EIS.

Air Quality

1973 EIS

The EIS discussed air quality impacts in Vol. I, Ch. III, Sec. D, and Vol. III, Ch. IV, Sec. C.

Total emission rates are dependent on production rate but for an average 50,000 barrel a day production rates are (Double for 100,000 bbls/day - Vol. III, p. IV-100):

Particulates	163 - 417 lbs/hr	(Vol. I, p. III-122-3, 133; Vol. III, p. IV-97, IX-5)
SO_2	4080 - 7750 lbs/hr	(Vol. III, p. IV-97)
NO_x	330 - 500 lbs/hr	(Vol. III, p. IV-97)

Vol. III, p. IV-97, states these emission rates would meet federal and state standards. CO and total hydrocarbons were discussed and identified as being well below acceptable limits (VII, p. III-147).

Air quality modeling resulted in the following: (EIS Vol. I, p. III-145, 147)

- SO_2 would meet all air quality standards with 800' stacks and 90% control.
- Particulates could be controlled to meet all standards.
- NO_x would meet all standards with conventional stack heights and no specific control. Total hydrocarbons and carbon monoxide would be well below all standards.

DDP

The DDP estimates the emission data for a 106,000 BPD commercial facility as follows:

(Table 4.2-6, Vol. II)	Particulates	433 lbs/hr
	SO_2	299 lbs/hr
	NO_x	1869 lbs/hr

The EPA has designated the area around Tracts U-a and U-b as a Class II area for purposes of PSD regulation (Vol. II, p. 4-6). To determine if projected emissions will meet EPA standards, modeling was done using the VALLEY model. This model was verified on Tract C-b (Vol. II, p. 5-8). The maximum predicted annual average off-tract concentrations are as follows (Vol. II, p. 5-25):

Pollutant	Maximum Impact (ug/m^3)	Applicable Standards NAAQS	Applicable Standards PSD (II)
Particulates	16.3	60	37
SO_2	13.7	80	20
NO_2	76.6	100	-

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The predicted maximum off-tract 24-hour average concentration is as as follows (Vol II, p. 5-29):

Pollutant	Maximum Impact (ug/m^3)	Applicable Standards NAAQS	 PSD (II)
Particulates	36.8	150	37
SO_2	20.6	365	91

Comparison

Projected emissions of particulates are consistent with the range given in the EIS while emissions of SO_2 are considerably less due to better control. While emissions of NO_x are considerably higher than in the EIS, they are still well within NAAQS standards.

Modeling work indicates that particulate and SO_2 emissions are well within PSD limits for Class II designation.

CONCLUSION

Contrary to all previous Detailed Development Plans, no individual, group, or agency has made a request - verbal or written - for a new EIS before DDP approval. Governor Scott Matheson stated in prepared remarks at a public hearing in Salt Lake City on 10/28/81, "We further believe that sufficient grounds exist for the USGS-DCM-Oil Shale to provide explicit approval for the DDP at this time." He further stated, "The State is committed to the Federal Prototype Program for Tracts Ua-Ub as the means of investigating the various environmental and technological programs associated with the development of oil shale."

Mr. Merrill Mecham, Commissioner of Uintah County, Vernal, Utah, testified that the County Commissioners were in favor of the development. He stated, "The DDP describes the project in sufficient detail to assist the local governments in planning mitigation procedures to minimize the effects of rapid growth in the area socially, environmentally, and economically." In conclusion he stated "...Uintah County supports the approval of the DDP for the White River Shale Project and the issuing of the construction permits at the earliest possible date."

Based on this analysis and the comments of outside reviewers, it is our opinion that no significant impacts can be expected to result from implementation of the DDP that were not identified and described in the EIS; the degree of impacts to be expected from implementation of the lessee's plan is consistent with the degree of impacts that the EIS predicted might result; the types of operations proposed in the DDP were identified and described in the EIS; and that no new information has indicated that the EIS was materially incomplete or inaccurate in any respect. Based on the above, an additional EIS at this time is not required and would not add to the knowledge already available to the supervisory agencies and the public.